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ITT Fluid Technology
Corporation

April 29, 1993

2166-05288

Mr. Roy Sakaida
Supervising Water Resource Control Engineer
California Regional Water Quality Control Board
Los Angeles Region
101 Centre Plaza Drive
Monterey Park, California 91754-2156

WELL INVESTIGATIONS PROGRAM - SUPPLEMENTARY SUBSURFACE
INVESTIGATION (FILE NO. 104.0582)

Dear Mr. Sakaida:

Enclosed please find three (3) copies of ITT's "Supplemental Work Plan for Additional Work Elements at the ITT Burbank Site", prepared by ICF Kaiser Engineers and dated April, 1993. This work plan is being submitted for approval as agreed upon during a meeting held between ITT and LARWQCB on February 23, 1993.

ITT is committed to implementing remedial measures at the Burbank site. Upon completion of the work described in the above work plan, and also upon completion of the additional vadose zone characterization as proposed in our November 30, 1992 correspondence, ITT will prepare a remedial action plan for the site. ITT will seek the LARWQCB's concurrence along the way by maintaining a dialogue with the agency to expedite the approval process.

We look forward to an opportunity to discuss any questions you may have regarding the attached work plan. At your earliest convenience please contact us so that we may schedule the completion of this work.

Very Truly Yours,
ITT Aerospace Controls

Teresa P. Olmsted
Manager, Environmental Projects

cc: ~~G. Kwey~~/ G. Madyun - LARWQCB
P. Kani - LAFD
ITT Distribution

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WP/RWQ42993

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SUPPLEMENTAL WORK PLAN FOR ADDITIONAL WORK ELEMENTS AT THE ITT BURBANK SITE

Prepared for:

ITT

1200 South Flower Street
Burbank, California 91502

Prepared by:

ICF Kaiser Engineers
11290 Point East Drive, Suite 200
Rancho Cordova, California 95742

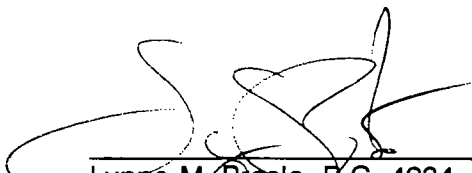
April 1993

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**SUPPLEMENTAL WORK PLAN
FOR
ADDITIONAL WORK ELEMENTS
AT THE
ITT BURBANK SITE**

Prepared by:

ICF Kaiser Engineers
11290 Point East Drive, Suite 200
Rancho Cordova, California 95742



Lynne M. Preslo, R.G. 4234
Vice President



Susanne Kraemer, C.E.G. 1666
Project Manager

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**SUPPLEMENTAL WORK PLAN FOR ADDITIONAL WORK ELEMENTS
AT THE ITT BURBANK SITE**

Well Investigations Program - File No. 104.0582

1.0 INTRODUCTION

1.1 OVERVIEW

The ITT Burbank site is located at 801 Allen Street, Glendale and 1200 Flower Street Burbank, California (Figure 1-1). This supplemental Work Plan describes additional work elements for the ITT Burbank site as follows:

- Installation of ten groundwater monitoring wells.
- Commencement of hydraulic testing at the ITT Burbank site.
- Analysis of the collected data to identify potential remedial measures.

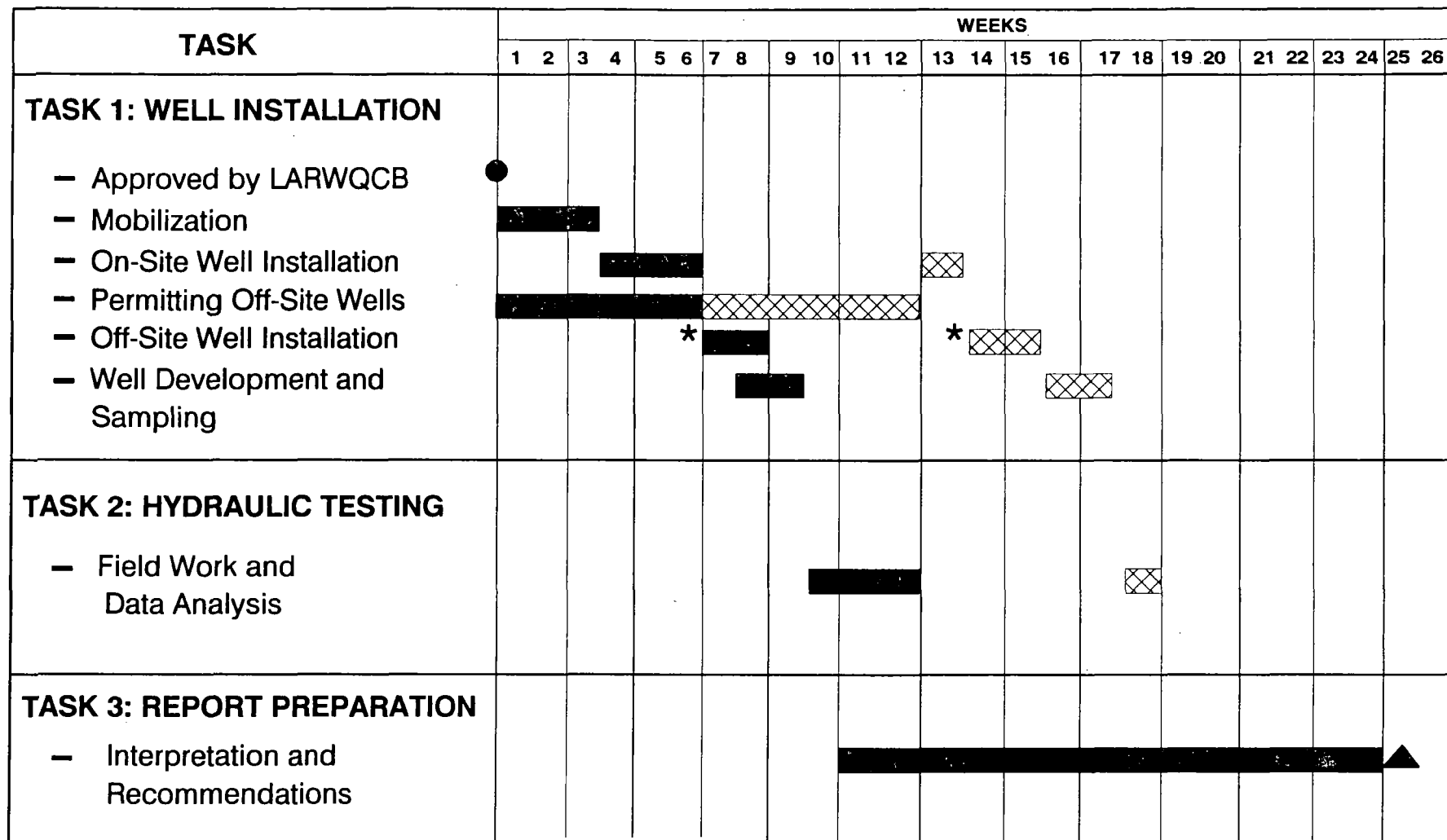
The tasks described above are discussed in this Work Plan, and an anticipated schedule for completion of these tasks is included on Figure 1-2. As agreed to during a meeting between ITT and the Los Angeles Regional Water Quality Control Board (LARWQCB) on February 23, 1993, this Work Plan supplements and revises the proposed work that was originally submitted to the LARWQCB on November 30, 1992.

In accordance with LARWQCB direction, vadose zone work described in that November 30, 1992 submission is not included herein. ITT is awaiting the LARWQCB's review and approval of previously proposed vadose zone work. LARWQCB has indicated that review of ITT's proposal will be completed by the end of April 1993.

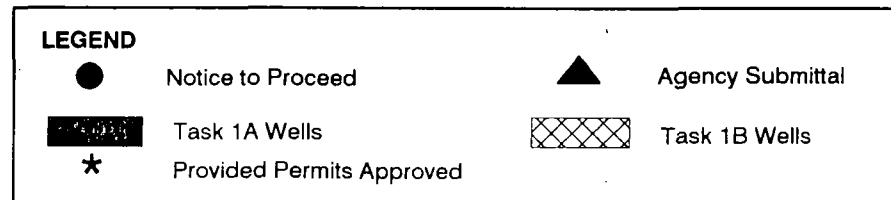
ITT is committed to implementing remedial measures at the ITT Burbank site. This Work Plan, in conjunction with the proposed vadose zone work is an integral part of meeting that remediation goal. The results of the scope of work proposed in this Work Plan will be used to initiate the evaluation of potential remedial alternatives for groundwater at the ITT Burbank site. However, evaluation and selection of potential remedial alternatives for the groundwater at the site cannot be completed without the results of the vadose investigation.



FIGURE 1-1: AREA LOCATION MAP FOR ITT BURBANK SITE



Note: Schedule assumes no major delays in field work or permitting.



WP01-ITT.DRW/ITT-1

Figure 1-2: ANTICIPATED SCHEDULE FOR SUPPLEMENTAL WORK

ITT will seek the LARWQCB's concurrence by maintaining a dialogue with the agency to expedite the approval process.

1.2 SUMMARY OF ANALYTICAL RESULTS OF PREVIOUS INVESTIGATIONS

This Work Plan is one of a series of documents that have been completed for the investigation work conducted at the ITT Burbank site. A complete listing of the reports prepared for the ITT Burbank site can be found in Appendix A. Detailed discussions of the investigation activities to date can be found in the documents as listed in Appendix A. Each quarter groundwater monitoring of the site wells is conducted and results submitted to the LARWQCB, along with discussion of other site activities. There are currently eight groundwater monitoring wells present at the ITT Burbank site.

1.2.1 Soils

To date, residual contamination has been identified in three general areas of the site. These areas are designated as Area I, Area II, and Area III (Figure 1-3). Area I includes the former passivate plating area, plating room, and Bright Dip area which are located in the easternmost portion of Building 3. Area II includes the compressor, rock tumble and sandblast, transformer, and waste oil rooms which are found in the southeastern corner of Building 3 and in the alley between Buildings 2 and 3. Area III consists of the southernmost portion of Building 2. Based on historical records, chlorinated solvents, alcohols, oils, acids, and cyanide and barium compounds were used during operations in the eastern portion of Building 3 (Areas I and II). Chlorinated solvents, diesel fuel, acids, oils, kerosene, and butane were used during historical operations in Building 2, where Area III is located. Generally, the vadose zone soil constituents coincide with the chemicals historically used in Buildings 2 and 3.

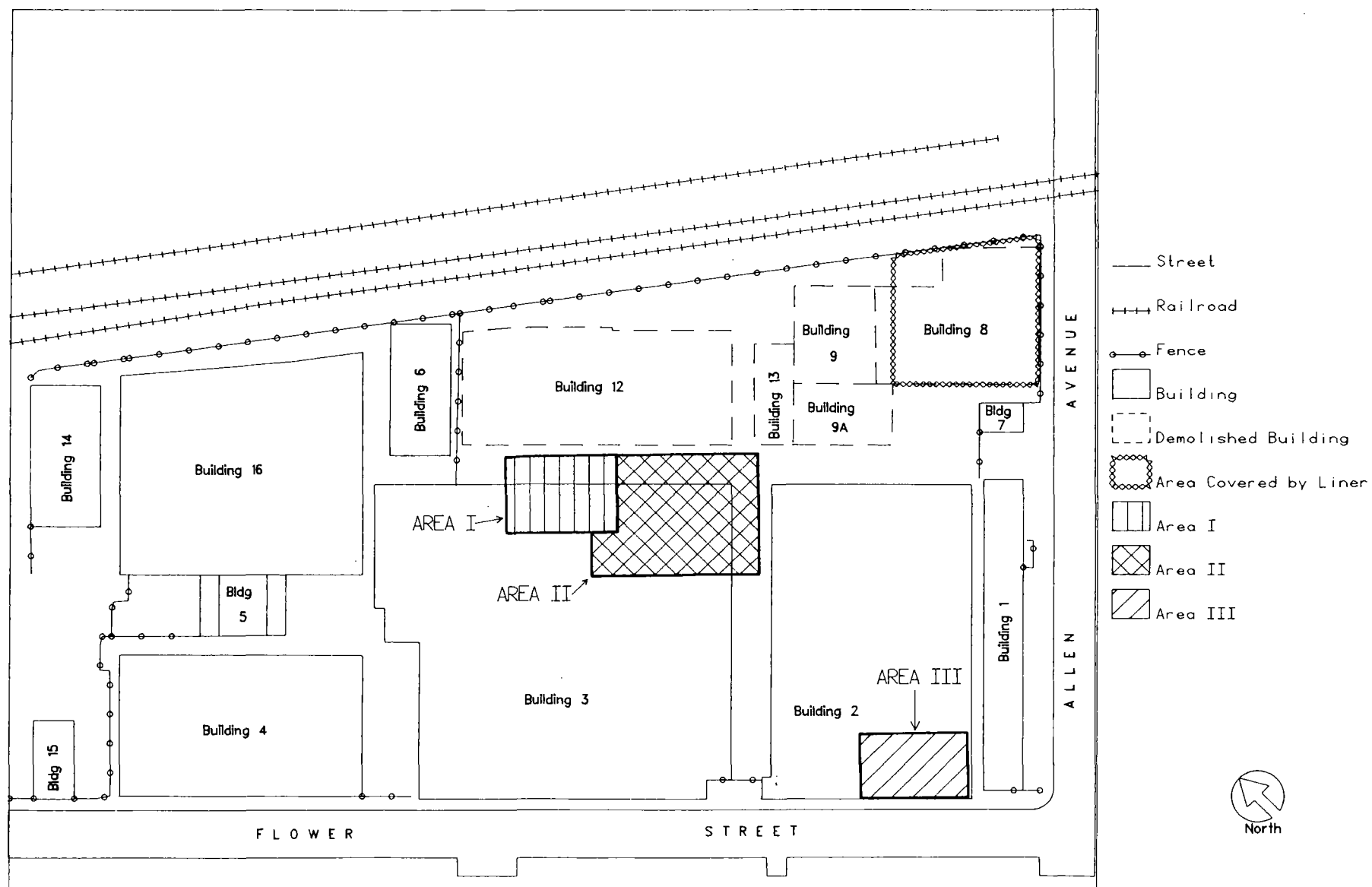
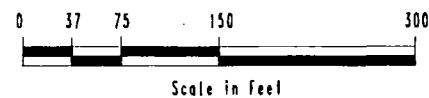


Figure 1-3: Location of Area I, II, III at ITT Burbank Site



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The chemical characteristics and distribution within the vadose zone underlying Areas I, II, and III are summarized below:

- Area I encompassed previous borings WSB 3-4, WSB 3-5, and WSB 3-8 and was characterized by: 1) concentrations of total volatile organic compounds (VOCs) up to 1,843 mg/kg in the soils; 2) soil vapor VOC concentrations within the 4,000+ $\mu\text{g/L}$ isopleth boundary; and 3) levels of polychlorinated biphenyls (PCBs) up to 770 mg/kg in soils in boring WSB 3-8 within the Bright Dip Area.
- Area II encompassed previous borings WSB 3-1, WSB 3-2, WSB 3-7, SW-1, and SW-2 and was characterized by: 1) concentrations of total VOCs up to 132 mg/kg in the soils; 2) soil vapor VOC concentrations within the 4,000+ $\mu\text{g/L}$ isopleth boundary; 3) total petroleum hydrocarbon levels up to 63,000 mg/kg; and 4) levels of PCB, up to 0.2 mg/kg, in the shallow soils (5 feet) of boring WSB-2.
- Area III encompassed previous boring WSB 2-2 and was characterized by: 1) concentrations of total VOCs up to 49.2 mg/kg in the soils; 2) soil vapor VOC concentrations generally less than 1,000 $\mu\text{g/L}$, and at locations where deeper samples were collected, the soil vapor VOC concentrations increased with depth; 3) total petroleum hydrocarbon levels up to 42,000 mg/kg soils; and 4) levels of PCBs, up to 0.43 mg/kg, in the soils in boring WSB 2-2.

In addition, PCBs have been detected in the Building 8 area soils. Groundwater samples have not yielded PCBs. Numerous reports have been submitted to the Los Angeles County Fire Department Hazardous Materials Division and the LARWQCB which were specific to investigations conducted in Building 8 (Appendix A). The Building 8 area will be evaluated as part of the site-wide vadose zone remedial planning.

1.2.2 Groundwater

Based on the investigation work performed to date at the ITT Burbank site, two water-bearing zones have been intersected by the eight wells presently in place at the site: 1) the perched groundwater, which is present below the northeastern portion of the site at

approximately 40 feet below ground surface (bgs) and in which two monitoring wells are screened, and 2) the upper water-bearing zone, which is found at approximately 70 feet bgs and in which six monitoring wells are screened.

The monitoring wells proposed in this Work Plan will be completed within the upper water-bearing zone and in the next underlying water-bearing zone. The next underlying water-bearing zone is expected to be encountered from approximately 120 to 200 feet bgs based on other wells in the region.

1.2.2.1 Perched Groundwater

Perched groundwater is found at a depth of approximately 40 feet below the east portion of the ITT Burbank site and has an apparent south to southwest gradient. Wells PW-2 and PW-3 monitor the perched groundwater in the northeastern area of the site. Diesel is the predominant constituent detected in the perched groundwater. A diesel product layer observed in PW-2 has the approximate thickness of the diesel product layer observed in the boundary wells at the adjacent Interstate Brands Corporation (IBC) property, which is located northeast of the site just across the Southern Pacific Railroad Mainline. Groundwater at the IBC site has been found to contain a layer of diesel product as a result of underground storage tank releases. This layer has ranged in thickness from 0.8 to 10 feet across the IBC site.

In addition, detectable levels of the following compounds also were observed in Well PW-2: benzene; isopropyl benzene; n-propyl benzene; naphthalene; toluene; 1,2,4-trimethylbenzene; 1,3,5-trimethylbenzene; and p-isopropyltoluene. These compounds are typically associated with petroleum products. The IBC site has installed an extraction system to remove the diesel product in the perched groundwater zone; however, to date groundwater extraction has not begun.

1.2.2.2 Upper Water-Bearing Zone

Summary of Groundwater Flow Direction

The upper water-bearing zone is found at depths ranging from approximately 65 to 75 feet bgs across the ITT Burbank Site. Groundwater flow direction in the upper water-bearing zone at the ITT Burbank site appears anomalous to the regional southeasterly trend. Based on the observed groundwater elevations in SW-1, SW-2, PW-5, PW-6 and PW-1, the groundwater appears to flow to the north, opposing the regional flow trend. However, the flow pattern is to the east based on the groundwater elevations observed in wells SW-2, PW-5, and PW-4. The anomalies suggest the potential that: 1) a hydrogeological feature may be present at the site such as faulting, which is common in the surrounding area, 2) the wells may be monitoring semi-isolated lenses within the upper water-bearing zone, 3) there may be poor hydraulic connection in some wells, and/or 4) groundwater gradients on-site may be affected by pumping of municipal wells in the area.

Information regarding groundwater flow direction and gradients, and the corresponding effect on the distribution of the chemicals in the groundwater, will be augmented with the installation of the additional wells as proposed in this Work Plan.

Summary of Groundwater Chemistry

Based on the regional groundwater flow direction, the approximate upgradient area of the site for the upper water-bearing zone is monitored by Well PW-1. Although additional wells are proposed to further assess groundwater gradients, water quality samples collected from PW-1 indicate that groundwater migrating onsite at the present time contains: 1,1-dichloroethene (1,1-DCE), 1,1-dichloroethane (1,1-DCA), cis-1,2-dichloroethene (cis-1,2-DCE), and perchloroethene (PCE); levels in Well PW-1 (up to 4,960 µg/L total VOC in March 1993) were higher than those observed in the upgradient perched zone well, PW-2 (up to 88 µg/L in March 1993).

A summary of the general concentrations observed in the most recent groundwater sampling (March 1993) for the four predominant VOCs (trichloroethene (TCE); 1,1,1-

trichloroethane (1,1,1-TCA); PCE; and 1,1-DCE) detected in the site wells completed in the upper watering-bearing zone is presented below:

- TCE levels detected in groundwater across the site ranged from 600 $\mu\text{g/L}$ in upgradient PW-1 to up to 10,000 $\mu\text{g/L}$ in the wells SW-1 and SW-2 in the central portion of the site, and ranged from 1,800 to 9,000 $\mu\text{g/L}$ in wells monitoring the southwestern boundary (PW-4, PW-5, and PW-6).
- 1,1,1-TCA levels of 110 $\mu\text{g/L}$ were observed in the upgradient well PW-1, up to 8,900 $\mu\text{g/L}$ in wells SW-1 and SW-2, and up to 310 $\mu\text{g/L}$ in wells monitoring the southwestern site boundary.
- PCE levels of 240 $\mu\text{g/L}$ were observed in the upgradient well PW-1, up to 480 $\mu\text{g/L}$ in wells SW-1 and SW-2, and up to 310 $\mu\text{g/L}$ in wells monitoring the southwestern site boundary.
- 1,1-DCE levels of 3,400 $\mu\text{g/L}$ were observed in the upgradient well PW-1, up to 3,600 $\mu\text{g/L}$ in wells SW-1 and SW-2, and up to 970 $\mu\text{g/L}$ in wells PW-5 and PW-6 monitoring the southwestern site boundary.

2.0 SCOPE OF WORK

2.1 WORK PLAN OBJECTIVE

The objective of this Work Plan is to collect the needed information to fulfill ITT's commitment to implement interim remedial measures for the ITT Burbank site. This Work Plan outlines three tasks to meet this objective. These tasks include:

Task 1A: Install, develop and sample the first seven proposed monitoring wells.

Task 1B: Evaluate the data from the newly installed wells to best locate the three additional monitoring well locations. Install, develop and sample the three additional wells.

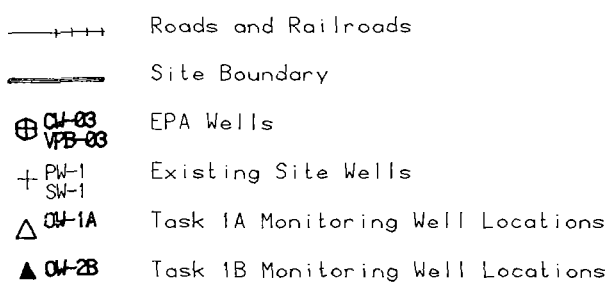
Task 2: Perform hydraulic testing.

Task 3: Analyze data and identify potential interim remedial measures.

2.2 TASK 1: WELL INSTALLATION, DEVELOPMENT AND TESTING

2.2.1 Proposed Groundwater Well Locations

To achieve the objectives stated above, the ten monitoring wells proposed in this Work Plan will be installed in two stages. Task 1A comprises the installation of four monitoring wells in the upper water-bearing zone and three monitoring wells in the next underlying water-bearing zone. Task 1B consists of the installation of three additional wells proposed at this time; however, the final locations will be based on a review of the data collected from the Task 1A monitoring wells and existing data. The proposed Task 1B wells include two monitoring wells completed in the upper water-bearing zone and one monitoring well completed in the next underlying water-bearing zone.



- "A" Denotes Upper Water-Bearing Zone Well
- "B" Denotes Next Underlying Water-Bearing Zone Well
- "OW" Denotes Offsite Location



Figure 2-1 : Proposed
Monitoring Well Locations,
ITT Site Burbank, CA

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TABLE 2-1

PROPOSED MONITOR WELLS AND RATIONALE

TASK 1A

WELL ID	LOCATION	RATIONALE
PW-2A (total depth approx. 100 ft.)	Onsite adjacent to perched Well PW-2	<ul style="list-style-type: none"> Located at upgradient edge of the ITT Burbank site based on the regional groundwater flow direction. Provide additional information on the quality of groundwater entering the ITT Burbank site in the upper water-bearing zone from the direction of the IBC property. Assess possible hydraulic connection between the perched zone and upper water-bearing zone.
PW-3A (total depth approx. 100 ft.)	Onsite adjacent to perched Well PW-3	<ul style="list-style-type: none"> Located near the downgradient side of site based on the regional groundwater flow direction. Provide additional groundwater quality information leaving the ITT Burbank site in upper water-bearing zone. Assess the hydraulic connection between the perched zone and upper water-bearing zone.
OW-1A (total depth approx. 100 ft.)	Offsite near the intersection of Alameda Ave. and the Southern Pacific Railroad (north of the site)	<ul style="list-style-type: none"> Located upgradient of the ITT Burbank site based on the regional groundwater flow direction. Refine the understanding of the groundwater flow direction and gradient in the area. Provide water quality data from potential upgradient sources and indicate the quality of groundwater flowing onto the ITT Burbank site.
OW-2A (total depth approx. 100 ft.)	Offsite near the intersection of Irving Ave. and Cosmic Way (south of the site)	<ul style="list-style-type: none"> Located downgradient of the ITT Burbank site based on the regional groundwater flow direction. Assess the distribution of chemicals in upper water-bearing zone downgradient of the ITT Burbank site in conjunction with groundwater data collected from EPA well CS-VPB-07 to the southeast and wells installed in the Standard Armament site to the southwest. Evaluate possible hydraulic connection between upper water-bearing zone and the next underlying water-bearing zone at the well cluster.
PW-2B (total depth approx. 200 ft.)	Onsite adjacent to perched Well PW-2	<ul style="list-style-type: none"> Located downgradient of adjacent sites based on the regional groundwater flow direction to provide additional groundwater quality information from next underlying water-bearing zone groundwater entering the site. Assess the groundwater flow direction and gradient across the site. Hydraulic connection between upper water-bearing zone and the next underlying water-bearing zone using adjacent well PW-2A.
PW-4B (total depth approx. 200 ft.)	Onsite adjacent to Well PW-4	<ul style="list-style-type: none"> Located at the downgradient perimeter of the site based on regional groundwater flow to assess the quality of groundwater leaving the site in upper water-bearing zone. Evaluate the possible hydraulic connection between upper water-bearing zone and next underlying water-bearing zone using adjacent existing well PW-4.
OW-1B (total depth approx. 200 ft.)	Offsite near the intersection of Alameda Ave. and the Southern Pacific Railroad (same location as OW-1A).	<ul style="list-style-type: none"> Assess the groundwater quality upgradient of the ITT Burbank site based on the regional groundwater flow. Assess potential hydraulic connection between the two layers using the adjacent upper water-bearing zone well (OW-1A).
PW-7A (total depth approx. 100 ft.)	Onsite between Building 3 and 16	<ul style="list-style-type: none"> Located between PW-1, PW-6 and SW-1 to assess the groundwater flow direction in the north central portion of the site. Assess the quality of groundwater upgradient of Building 3.

TABLE 2-1 (Continued)

PROPOSED MONITOR WELLS AND RATIONALE

TASK 1B

WELL ID	LOCATION	RATIONALE
OW-3A (total depth approx. 100 ft.)	Offsite well adjacent damaged EPA Well VPB-03	<ul style="list-style-type: none">• Located upgradient of the site based on regional flow direction.• Refine the understanding of the groundwater flow direction and gradient in the area.
OW-2B (total depth approx. 200 ft.)	Offsite near the intersection of Irving Ave. and Cosmic Way (Same location as OW-2A)	<ul style="list-style-type: none">• Assess the groundwater quality downgradient of the ITT Burbank site.• Assess potential hydraulic connection between the two water-bearing layers using the adjacent OW-1A well.

The proposed wells are located on Figure 2-1. The proposed well locations, approximate depth of wells and rationale are summarized in Table 2-1. The proposed upper water-bearing zone wells are designated with an "A" (i.e., PW-2A) and the next underlying water-bearing zone wells (estimated to be completed between 140 to 200 feet bgs) are designated with a "B" (i.e., PW-2B). The future well designations will indicate the well number and the total depth of completion; for example PW-2-100 would represent a well completed to a depth of 100 feet bgs.

2.2.2 Analytical Method for Samples Collected From Proposed Wells

Based on previous results at the site, the analytical methods for the proposed upper water-bearing zone and the next underlying water-bearing zone monitoring well samples are outlined below:

<u>Parameter</u>	<u>EPA Method</u>	<u>Wells to be Sampled</u>
VOCs	524.2	All new monitor wells.
Diesel Fuel	8015 Modified	PW-2A and PW-3A.
Total Recoverable	418.1	PW-2A and PW-3A.
Petroleum Hydrocarbons		
Turbidity	180.1	All new monitor wells.
Nitrogen (NO ₂ , NO ₃)	300	All new monitor wells.
Ammonia (NH ₃)	350.2	All new monitor wells.

The new monitor wells will be included in the quarterly monitoring for the site, as completed. The initial results will be evaluated and, if warranted, the analytical suite will be modified for subsequent the quarterly sampling rounds. Recommended changes will be submitted to the LARWQCB in the Quarterly Sampling and Analyses Report.

2.3 SOIL SAMPLING FOR CHEMICAL ANALYSIS

Soil samples for chemical analysis will be collected in the vadose zone for two proposed well locations, PW-7A and PW-4B. These two onsite locations are not adjacent to previously sampled borings, but are near areas where contaminants exist in the soil.

Because undisturbed soil sample collection is less efficient with the dual-wall percussion hammer method, the samples will be collected at 10-foot intervals.

Based on soil samples collected from previous borings in the vicinity of the two locations, soil samples will be collected for total petroleum hydrocarbon, and VOC analysis using EPA methods 418.1 and 8240, respectively (see Section 3.1).

2.4 TASK 2: HYDRAULIC TESTING

To evaluate hydraulic parameters of the water-bearing zones at the site, we propose to perform slug tests on selected existing and proposed wells (Table 2-2). These tests will provide preliminary data for evaluating the hydraulic conductivity of the saturated material in the immediate vicinity of the tested wells. These data can subsequently be used to characterize the saturated materials and provide an order-of-magnitude estimate of expected aquifer yield for future long-term pump test design. Slug testing was chosen to obtain immediate data efficiently. The data will also provide information on the well development effectiveness. The methodology to be used is discussed in Section 3.5.

The performance of slug tests is the initial phase of hydraulic testing for the site. Future plans include a second phase of hydraulic testing that will consist of step-drawdown testing in preparation for interim remedial measures at the site. The third phase will be a long-term pumping test that may be conducted in conjunction with the interim remedial measures in order to manage the groundwater generated. The report, summarizing the newly collected data, will include recommendations for additional hydraulic testing.

2.5 TASK 3: DATA ANALYSIS AND DEVELOPMENT OF POTENTIAL INTERIM REMEDIAL MEASURES

The focus of the data analysis will be to provide the information needed to achieve the objective of identifying interim measures for the ITT Burbank site. To obtain the information needed, the following analyses will be completed:

TABLE 2-2
WELLS PROPOSED FOR HYDRAULIC TESTING

WATER-BEARING ZONE	WELL	COMMENTS
Perched Zone	Well PW-2	Cluster with PW-2A and PW-2B.
Upper Water-bearing Zone	Well PW-2A	Cluster with PW-2 and PW-2B.
	Well OW-1A	Upgradient data point.
	Well PW-4	Downgradient data point.
	Well SW-2	Central data point.
	Well PW-3A	Optional, depending on results of other wells.
Next Underlying Water-bearing Zone	Well PW-5	Optional, depending on results of other wells.
	Well 1B	Upgradient data point.
	Well 2B	Cluster with PW-2 and PW-2B.
	Well 4B	Downgradient data point.
	Well 3B	Optional, depending on results of other wells.

- Develop a hydrogeologic conceptual model for both the onsite and offsite areas, including further definition of the upper water-bearing zone, and initial assessment of the next underlying water-bearing zone.
- Evaluate the hydraulic connection between the three water-bearing zones.
- Assess the properties of the water-bearing zones that influence groundwater and chemical transport including rate and direction of groundwater flow.
- Evaluate the distribution of chemicals in the three water-bearing zones.
- Assess the potential linkage of the onsite vadose zone sources with the perched and upper water-bearing zones.

3.0 METHODOLOGY

3.1 WELL INSTALLATION

Dual-wall percussion hammer drilling methods will be used to construct the proposed wells. This method is proposed for the upper water-bearing wells because of the problem of heaving sands encountered during the installation of the existing site wells.

The dual-wall percussion hammer drilling method will be used for all of the wells where two or three water-bearing zones occur due to the potential of cross-contamination between the water-bearing layers. A third sleeve on the drill pipe will be used on the two wells to case off the perched groundwater zone. In addition, using the dual-wall percussion method will minimize the volume of waste generated during the drilling process. The dual-wall percussion method has been successfully used in the Crystal Springs area (JMM, 1991) and other areas for environmental applications (Strauss, Story, and Mehlhorn, 1989).

The dual-wall percussion hammer system uses an open-faced bit that is flush-threaded to the dual-wall drill pipe. The drill string is hammered into the ground, temporarily casing the borehole. The fragments returned to the surface are generally representative of the grain size and character of the formation and will be logged for lithology at a minimum of every 5-feet using the United Soil Classification System. The moisture in the drill cuttings will be monitored for indications of water-bearing zones. Dry cuttings will be returned to the surface when the water-bearing zones have been penetrated and cased off. Samples will be collected through upper water-bearing and next underlying water-bearing zones for evaluation of well screen sizing.

The open inner pipe and open-faced bit of the dual-wall system allow undisturbed samples to be collected ahead of the drill string. Soil samples of the clay material expected to be encountered at approximately 100 feet bgs onsite and offsite will be collected for laboratory permeability testing. In addition, the selected soil sampling for chemical analyses (PW-7A and PW-4B) will be collected in brass sleeves using a California split-spoon sampler following the protocol described in the Preliminary Report (ICF KE, 1991). Each boring will be logged under the supervision of a geologist registered in the State of California.

The monitoring wells will be constructed inside the drill pipe or the hollow-stem auger using 4-inch stainless steel wire-wrapped screen and schedule-40 polyvinyl chloride (PVC) casing for the upper water-bearing zone wells and Schedule-80 PVC casing for the lower water-bearing zone wells. The joints will be flush-threaded. The length of screen for wells to be installed in the upper water-bearing zone wells will be assessed based on the depth of the expected competent clay layer. The length of the screen for wells to be installed in the next underlying water-bearing zone will be based on the result of the geophysical logging of the test hole. The proposed screen slot size will be 0.02 inch unless evaluation of the saturated zone material indicate a different slot size is required. The well casing will be suspended and centralized, so as not to rest against the sides or bottom of the hole prior to installing the gravel pack. The well construction material will be cleaned and inspected prior to installation.

The annular space will be filled with a clean, well-sorted sand approximately 3 to 5 feet above the top of the well screen. The sand will be poured slowly from the surface, kept at a level inside of the drill pipe and sounded periodically with tape to monitor for bridging. A 2-foot minimum bentonite seal will be installed above the sand pack and the remaining annular space will be filled with a cement/bentonite grout. The seal will be allowed to set for a minimum of 48 to 72 hours prior to development.

Each well will be completed with a locking lid flush-mounted. Flush-mounted wells will include a monitoring well box with cover built slightly above-grade to avoid surface water accumulation around the well head. A typical construction diagram is shown on Figure 3-1. The off-site well completions will meet standards specified by the Cities of Burbank and Glendale.

3.2 MONITORING WELL DEVELOPMENT

Following installation, the wells will be developed using surge block and pumping methods to draw the fine material out of the sand pack. Coarse material will be bailed from the well and then the well will be pumped until the water is clear and the field measurements of temperature, pH, and specific conductance stabilize. The minimum volume of water purged from the well will be approximately five times the volume of water in the screen and blank pipe plus the saturated annulus (assuming a porosity of 30 percent for the sand pack).

The downhole equipment will be steam cleaned between holes to avoid cross contamination. Development water will be containerized pending analytical results and determination of disposal options. The material generated offsite will be containerized, labelled and returned to the site for proper disposal.

3.3 GEOPHYSICAL LOGGING

Geophysical logging of the wells installed in the next underlying layer will be performed using a natural gamma probe and a neutron density probe. These logs will be run to verify lithologic boundaries and identify saturated intervals, if possible. The logs will be run through the drill pipe once the total depth of the pilot boring has been drilled. Wells installed in the upper water-bearing zone will be logged using the natural gamma probe after the well has been completed because of the lithologic detail available from the previously installed wells. These logs will be run to verify lithologic boundaries, if possible. The natural gamma probe and the neutron density probe for geophysical logging can penetrate casing, drill pipe, or cased wells.

The use of neutron logging for the next underlying water-bearing zone to augment the gamma log is proposed, because the potential for pattern interferences in gamma logging exists, which may obscure sand-clay interfaces. These interferences are caused by sands high in potassium, which is not uncommon in sands from the southeastern portion of the San Fernando Valley. The gamma and neutron logs produced will be compared to the lithologic logs to correlate the variability in the geophysical logs with the geological conditions. By correlating the natural gamma logs to the neutron, and lithologic logs, interferences produced by the presence of high potassium sands, if present, should be identified.

Measurements will be taken as each probe is lowered down the well casing or drill pipe, and again as the probe is raised to the surface, for a total of two logging rounds. The probe will be decontaminated between each use with an Alconox/water wash, double rinse, and final deionized water rinse.

3.4 WATER LEVEL ELEVATIONS

Groundwater levels will be measured with an electric water level probe in all wells prior to sampling. The probe will be decontaminated with a deionized water rinse between wells. Measurements will be taken from a surveyed reference point marked on the top of the PVC risers. Water level measurements will be taken within 0.01 foot and recorded in the field notebook or on field sampling sheets. The newly installed wells will be incorporated into the site-wide monthly water level monitoring.

3.5 HYDRAULIC TESTING METHODOLOGY

The initial stage of hydraulic testing will consist of slug tests. The two types of slug tests (falling-and rising-head tests) will be conducted on selected wells. Objectives and rationale for these tests are presented in Section 2.4. Rising and falling head tests will be accomplished by adding and then removing a solid cylinder of known volume from the well. The rate at which the water level in the well recovers to the static level will be measured for analysis.

A pressure transducer will be installed near the base of the well. The transducer and water levels will be allowed to equilibrate to static conditions and recorded. A solid slug will then be immersed completely below static water level. Water levels will then be measured over time, until the water level has fallen to within 20 percent of the static level. At this point, the falling-head test ends and a rising-head test will begin by removing the solid slug from the well. Measurements will then continue, with reference to time until the water level rises to within 20 percent of the static level. The slug test equipment used in the wells will be cleaned between holes to avoid cross contamination using an Alconox/water wash, double rinse and distilled water rinse.

The selection of the appropriate method that will be used to analyze data generated during the falling-and rising-head testing will depend on the configuration of the well screen and its relationship to the static water level. Based on the water-bearing zone characteristics, the appropriate analytical method will be selected such as the Bouwer and Rice Slug Test method or the Nguyen and Pinder Method. (Bouwer, H. and R.C. Rice, 1976; Nguyen, V., and G.F. Pinder, 1984).

3.6 GROUNDWATER SAMPLING

For the newly installed upper water-bearing zone monitoring wells, dedicated pump systems will be installed. These systems will be compatible to the existing systems onsite. Hydraulics of the next underlying water-bearing zone wells will be assessed to determine the appropriate pump system. Initial sampling of the next underlying water-bearing zone will be completed using a portable submersible pump for purging and a bailer for sample collection.

The monitoring wells will be sampled following accepted protocols used for the quarterly sampling program. Prior to sampling, the water level will be measured and the well volume will be calculated. Three well volumes will be purged using a dedicated submersible pump. During the purge cycle, field measurement of pH, conductivity, temperature, and visual observations will be recorded in the logbook or on sampling data sheets to verify well stabilization. To collect a representative water sample, stabilization will be deemed complete when three successive measurements of field parameters are within 10 percent. Wells that pump dry will be evacuated once before being sampled. Onsite and offsite generated purge water will be containerized and labelled pending analysis for proper disposal.

Sample bottles will be laboratory cleaned and prepared with appropriate preservatives. Samples will be labeled, capped tightly, placed in plastic bags and shipped or transported on ice overnight to the laboratory. Appropriate chain-of-custody procedures will accompany the samples. Nondisposable equipment used during sampling will be decontaminated using a Alconox/water wash, double rinse and distilled water rinse.

Duplicate VOC samples will be collected at 10 percent of the total samples. Trip blanks will travel with shipments to and from the lab at least once a week. In addition, ambient field blanks will be collected at 20 percent of the total sample volume. Equipment blanks will be collected in the event a bailer is used.

3.7 ELEVATION SURVEY

The monitoring wells will be surveyed by a State of California licensed surveyor and tied to an established benchmark. The benchmark location and survey date will be determined following the installation of the monitoring wells. The vertical survey will be

accurate to 0.01 foot relative to mean sea level. A permanent mark or cut will be made on the well casing for reference. In addition, a survey point will be made to a hole in the well cap where water level measurements will be collected. Care will be taken during well construction that the top of casings are cut parallel to the ground. The horizontal reference for the well locations will utilize California coordinate system and will at a minimum be accurate to 0.1 foot.

3.8 MONITORING WELL PERMITS

Prior to the commencement of drilling activities, a permit for each monitoring well will be obtained from the Los Angeles County Health Department, Water and Sewage Section. In addition to a fee of \$107.00 per well or boring, details of the proposed well construction or grouting method, a map indicating exact locations of planned wells or borings, and completed well permit/boring applications will be submitted for approval. Processing of the well permits may take up to four weeks to complete. However, the County Health Department realizes the need to expedite permit approval, and verbal approval is generally granted from three to five working days after submittal of the appropriate paperwork.

The City of Burbank requires written notification prior to commencement of drilling activities. Notification will be completed by letter and will state where monitoring wells are to be located and reasons for the installation of the monitoring wells. No fee is required. However, for wells installed in public right-of-ways the City of Burbank requires of \$250.00 processing fee per well and an annual \$100.00 fee per well. Additionally, the city requires an encroachment agreement, certificate of liability, an excavation permit (\$50.00), and inspection fees at \$34.00 per hour. A refundable construction deposit is also required of \$500.00 to \$1,000.00 per well. Notification will be sent to:

City of Burbank
Department of Public Works -- Engineering
275 East Olive Avenue
Burbank, California 91502
ATTN: Public Works Director

The City of Glendale also requires permission prior to drilling a monitoring well. No fee is required. The following information is requested: (1) location of proposed well, (2)

depth of proposed well, (3) reason for installation of well, and (4) facility at proposed well location. For offsite well locations, the City of Glendale requires an encroachment permit prior to drilling a monitoring well in a public right-of-way. This includes an \$850.00 fee and the following items are requested as part of the permit application: (1) plot plan showing proposed well locations, (2) certificate of liability, and (3) Los Angeles County Health Department permit to install a monitoring well. Requests are to be submitted to:

City of Glendale
Water Services Department
141 N. Glendale, 4th Floor
Glendale, California 91306-4496
ATTN: Mr. Ray Notario

The application should be processed in three to four weeks. Following completion of well installation, the City of Glendale will be sent a well inspection report prepared by a California Registered Geologist with well construction details and geologic logs for the wells. In addition, the wells will be registered by the State of California and issued State well numbers.

3.9 WASTE HANDLING PROCEDURES

The drill cuttings will be containerized in DOT approved steel drums, then labelled and stored in a designated waste storage area onsite pending analysis. Personal protective equipment (PPE), plastic sheeting and other disposable wastes generated at the drill sites will be containerized with the cuttings and disposed of properly.

Rinsate generated from the decontamination of sampling equipment and groundwater generated from purging and development activities will be collected in containers approved by the DOT for liquids. The containers will be labelled, stored onsite and sampled to evaluate proper disposal alternatives.

3.10 FIELD QA/QC PROCEDURES

The overall quality assurance/quality control (QA/QC) objective for field activities and laboratory analyses is to produce data of sufficient quality to support evaluation of

environmental effects. Standard procedures are used so that known and sufficient acceptable levels of accuracy, precision, completeness, representativeness and comparability are achieved for the data. QA/QC procedures are summarized below. Critical aspects of the field QA/QC program include:

- Documentation.
- Decontamination.
- Collection of duplicates and blanks.
- Chain-of-custody procedures.

3.10.1 Documentation

Pertinent field information will be recorded in ink in a bound log book. This data will include at least the following:

- Date and time of entries.
- Personnel onsite
- Activity and location.
- Field observation (i.e., soil descriptions, direct instrument readings, weather, unusual occurrences, water levels, volume and type of materials used).
- Sample information (time, depth, location, type of sample).
- Equipment calibration records.
- Level of protection.
- Any other observations useful in reconstructing activities.

3.10.2 Decontamination

Procedures for decontamination of field equipment utilized for sampling include:

- Wash split-spoon samplers, sample sleeves, Teflon bailer and HydroPunch between samples with laboratory-grade detergent (e.g., Alconox).
- Double tap water rinse.
- Distilled water rinse.

The drill pipe, hollow stem augers, bailers, swabs and other down-hole equipment will be steam-cleaned between holes and checked for residual soil or other foreign material. Pumps used for development or sampling will be steam-cleaned between wells.

3.10.3 Duplicates and Blanks

The laboratory QA/QC program established for the quarterly groundwater sampling will be continued. Duplicate groundwater samples will be collected at approximately 10 percent of the total samples. Ambient VOC blanks will be collected at 20 percent of the total number of VOC samples. An ambient blank will be collected by filling a VOA vial with distilled water and allowing the vial to remain uncovered for the duration of the sampling event at a well location. The purpose is to assess the VOC concentrations, if any, in the ambient air. The field blanks will be analyzed for the suite of analyses collected from the monitor wells.

3.10.4 Chain-of-Custody

The purpose of the chain-of-custody procedure is to document sample history from the time of collection, through transport, receipt and analysis. Any person accepting the responsibility for the samples will sign and date the form at the time of acceptance and relinquishment of the samples.

3.10.5 Laboratory QA/QC

The laboratory conducting the chemical analyses will be certified by the State of California Department of Health Services for each of the required analytical methods. At a minimum, EPA sample holding times and conditions will be observed. At the request of the LARWQCB, minimum laboratory QA/QC requirements will be met. These requirements include: field and reagent blanks, calibration check standards, matrix spiked duplicates, total recoverables, and laboratory quality control samples. QA/QC documentation will be reported and analytical results will indicate concentrations of analytes detected along with detection limits.

3.11 ANALYTICAL METHODS

The standard analytical methods which will be used to screen for analytical parameters were outlined in Section 2.2.2. The parameters identified were based on previous groundwater sample results. Table 3-1 contains the Practical Quantitation Limits (PQLs) and the Method Detection Limit (MDLs) for EPA method 524.2 from Converse Enviro Lab, which has been analyzing the groundwater samples for the quarterly sampling.

Under laboratory QA/QC protocols, MDLs are evaluated on a regular basis for most EPA analytical water-matrix methods. The MDLs provided in Table 3-1 are current as of the date of this document. MDLs generally are less than the PQLs listed for each parameter. Parameters which are detected below the PQL will be reported.

3.12 DATA VALIDATION

A review of 25 percent of the data collected in the investigation will be performed by chemists to assess the technical limitations of the data. Data validation is the systematic review of analytical data against a set of guidelines that results in qualification, as necessary, of individual results by using carefully defined data flags. The data review process will not directly address the question of whether a discrete result is correct, but rather will estimate, based on QC results, how large an error is associated with an individual data point. The data validation will be based on the guidelines outlined in Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses (EPA, April 1985); Laboratory Data Validation Functional Guidelines for Evaluating Pesticides/PCBs Analyses (EPA, May 1985); and Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses (EPA, November 1985).

TABLE 3-1

**METHOD DETECTION LIMITS (MDLs) AND PRACTICAL
QUANTITATION LIMITS (PQLs) FOR EPA METHOD 524.2**

CHEMICALS OF PARAMETERS	MDLs ($\mu\text{g/L}$)	PQLs ($\mu\text{g/L}$)
Benzene	0.11	0.50
Bromoform	0.22	0.50
Carbon Tetrachloride	0.21	0.50
Chlorobenzene	0.07	0.50
Chloroform	0.39	0.50
1,1-Dichloroethane	0.17	0.50
1,2-Dichloroethane	0.11	0.50
1,1-Dichloroethene	0.27	0.50
Ethylbenzene	0.09	0.50
Methyl ethyl ketone	5.00	N/A
1,1,2,2-Tetrachloroethane	0.28	0.50
Tetrachloroethene	0.33	0.50
1,1,1-Trichloroethane	0.24	0.50
1,1,2-Trichloroethane	0.22	0.50
Trichloroethene	0.28	0.50
Toluene	0.09	0.50
Trichlorofluoromethane (Freon 11)	0.24	0.50
Trichlorotrifluoroethane (Freon 13)	N/A	0.50
Vinyl chloride	0.40	0.50
m,p,-Xylene	0.18	0.50
o-Xylene	0.10	0.50

N/A: Current MDL or PQL not available at this time.

4.0 REFERENCES

- Bower, H. and R.C. Rice, 1976; "A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers with Completely or Partially Penetrating Wells." Water Resources Research, Vol. 12, No. 3.
- Environmental Protection Agency (EPA), April, 1985; "Guidelines for Evaluating Organic Analyses."
- EPA, May, 1985; "Laboratory Data Validation Functional Guidelines for Evaluating Pesticides/PCBs Analyses."
- EPA, November, 1985; "Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses."
- ICF Kaiser Engineers (ICF KE), August, 1991; "Results of Preliminary Groundwater and Soils Investigation." Consultant's Report to ITT.
- James M. Montgomery, Consulting Engineers, Inc. (JMM), May, 1991; "Technical Memorandum for the Phase I Crystal Springs Cluster Wells." Consultant's Report to Department of Water and Power, the City of Los Angeles, California.
- Nguyen, V., and G.F. Pinder, 1984; "Direct Calculation of Aquifer Parameters in Slug Test Analyses, Groundwater Hydraulics." American Geophysical Union Water Resources Monograph 9.
- Strauss, M.F., S.L. Story and N.E. Mehlhorn, 1989. "Applications of Dual-Wall Reverse-Circulation Drilling in Ground Water Exploration and Monitoring." Ground Water Monitoring Report, Spring 1989, pp. 63-71.

APPENDIX A

**REPORTS AND DOCUMENTS RELATED TO
ITT BURBANK SITE INVESTIGATIONS
ON FILE WITH THE LARWQCB**

APPENDIX A

REPORTS AND DOCUMENTS RELATED TO ITT BURBANK SITE INVESTIGATIONS ON FILE WITH THE LARWQCB

DOCUMENT	SUBJECT/TITLE	DATE
A.L. Burke (ALB)	Preliminary Site Investigation	August 1987
ALB	Preliminary Site Investigation Buildings 2, 3, and 8 Final Report	August 21, 1987
ALB	Closure and Additional Site Investigation Cost Estimate	August 21, 1987
ALB	Draft Final Report on Phase 2 Investigation	November 6, 1987
ALB	Closures for Process Sumps in Buildings 2 & 3	November 10, 1987
ALB	Workplan & Estimates for Closure of Building 8	January 4, 1988
ALB	Closure of Sump in Building 5	February 1988
OccuHealth Consultants	Building 12 Mercury Removal	February 23, 1988
ALB	Finalized Closure Plan for Sump in Building 5	March 10, 1988
ALB	Investigation of Contamination	April 1988
ALB	Overview of Investigation and Closure Actions	April 1988
ITT	Application for Closure	May 30, 1986
ALB	Site Characterization and Closure Workplan Draft	July 1988
OccuHealth Consultants	Asbestos Removal in Buildings 3 & 12	August 4, 1988
ALB	Workplan for ITT Building 8	October 6, 1988
ALB	Investigation of Subsurface Contamination	September 16, 1988
ALB	Scope of Work, ITT Projects	September 16, 1988
ALB	Subsurface Investigation Draft	November 1988
ALB	ITT Building 8 Decontamination & Demolition Progress Report #1	December 13, 1988
ALB	Progress Report - Building 3	December 27, 1988

**REPORTS AND DOCUMENTS RELATED TO ITT BURBANK
SITE INVESTIGATIONS ON FILE WITH THE LARWQCB (continued)**

DOCUMENT	SUBJECT/TITLE	DATE
ALB	ITT Building 8 Decontamination & Demolition Progress Report	January 12, 1989
ALB	Progress Report for Building 3	January 30, 1989
ALB	Progress Update, Building 8, ITT	January 30, 1989
ALB	ITT Building & Decontamination & Demolition Progress Report #3	February 17, 1989
ALB	Progress Report #2, Building 3, Preliminary	March 1989
ALB	ITT Building 7 Decontamination & Demolition Progress Report #4	May 2, 1989
ALB	Remediation, ITT Building 8, Final In-House Draft Report	August 3, 1989
Weston	Site Characterization Report and Action Plan for ITT Facility	November 2, 1989
ESI	Workplan, Transformer Clean-up	
Weston	Soil Gas Screening (Results) of the ITT Aerospace Controls, Burbank	March 27, 1990
Weston	Summary of Asbestos & Residue Sampling of Buildings 1,2, & 3	March 28, 1990
Weston	Dust Control at Building 8	
Weston	Preliminary Work Plan for Soil & Groundwater Characterization	June 14, 1990
Weston	Preliminary Work Plan for Soils & Groundwater Characterization - Final revised from June 14, 1990 Draft	November 12, 1990
ICF KE	Results of Preliminary Groundwater & Soils Investigation	August 14, 1991
ICF KE	Work Plan for Building 8, ITT Facility	October 15, 1991
ICF KE	Fourth Quarter Sampling and Analysis Report October - December, 1991	January 1992
ICF KE	First Quarter Sampling and Analysis Report January - March 1992	April 1992

**REPORTS AND DOCUMENTS RELATED TO ITT BURBANK
SITE INVESTIGATIONS ON FILE WITH THE LARWQCB (continued)**

DOCUMENT	SUBJECT/TITLE	DATE
IT Corporation	Health and Safety Plan for PCB Decontamination and Removal of Asbestos Containing Materials for the ITT Burbank Site	June 22, 1992 and July 6, 1992
ICF KE	Second Quarter Sampling and Analysis Report April - June 1992	July 1992
ICF KE	Building 8 PCB Sampling Program Report	August 1992
ICF KE	Third Quarter Progress Report July - September 1992	October 1992
ICF KE	Fourth Quarter Sampling and Analysis Report October - December 1992	January 1993
ICF KE	First Quarter Sampling and Analysis Report January - March 1992	April 1993